

# Rhodora

JOURNAL OF THE  
NEW ENGLAND BOTANICAL CLUB.

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Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS

MERRITT LYNDON FERNALD

HOLLIS WEBSTER

} Associate Editors.

WILLIAM PENN RICH

EDWARD LOTHROP RAND

} Publication Committee.

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VOLUME 7.

1905.

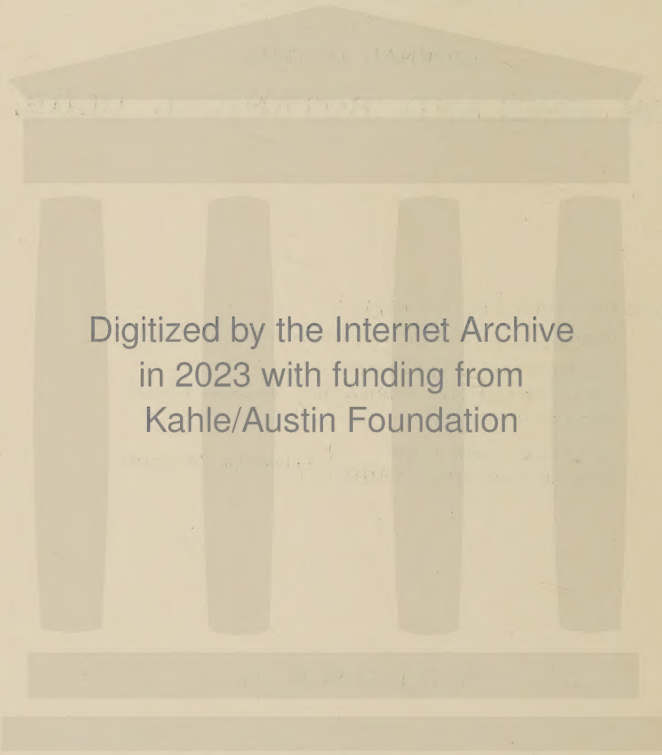
Boston, Mass.

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Printed by Edward W. Wheeler, Cambridge, Mass.

**RHODORA**.—A monthly journal of botany, devoted primarily to the flora of New England. Price \$1.00 per year (\$1.25 to all foreign countries except Canada); single copies 15 cents. Volume 1, \$1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

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Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

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# Rhodora

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## NOTES ON NEW ENGLAND VIOLETS,— II.

EZRA BRAINERD.

It would seem that after careful scrutiny of their claims two boreal species must be added to the list of New England violets. One is *Viola Novae-Angliae*, published by Mr. House in a recent number of RHODORA.<sup>1</sup> It is surely a good species, and was believed to be so by others before Mr. House pointed out its claims to recognition. Mr. Fernald, who collected the type specimens, wrote on sending duplicates to me with other material last February: "One, Mr. Pollard has called *V. emarginata*, but I can't believe that the little plant of Fort Kent and St. Francis (my nos. 2244, 2245) has much to do with the southern species. I have always been confident from the habitat of the plant and the high-northern species with which it grows, that it represented a thoroughly distinct species. I shall endeavor to get more and better material this year. I shall be glad to have you describe the plant, if you, too, feel that it is quite distinct."

Though recognizing its distinctness, I deemed it prudent to wait for summer specimens showing the mature leaves and fruit. During my brief study of the genus I had become painfully aware of the confusion that had arisen from the publication of scores of obscure and illegitimate species, based on scanty or immature material; and I felt that no one ought to create a species in this group before seeing the plant in its mature stages of growth. Accordingly Mr. Fernald went to the trouble and expense of a journey to St. Francis last July, secured midsummer specimens, and had the live plant reproduced in a water-color that beautifully exhibits the capsules of both petaliferous and cleistogamous flowers.

Meanwhile Mr. House, in entire ignorance of this investigation,

<sup>1</sup> RHODORA, vi. 226, pl. 59 (1904).

has described and figured the species from flowering specimens formerly sent to Mr. Pollard. Under the circumstances I am sure there will be no discourtesy, if from the new material in my possession I supplement his description, and point out some of the errors into which he has fallen from not knowing the mature fruit of this and of some of the other specimens cited.

With these data in hand it is not "difficult to decide the systematic position of this species." It is a very close ally of *V. septentrionalis*. In fact, I find only two evident characters by which it can be distinguished from that species,—the narrowness of the leaf and the absence of ciliation in the sepals. The two species are alike in pubescence, in the color of the petals, in the bearded spurred petal, in having sagittate cleistogamous flowers on short declined peduncles, and in the size, color and shape of the capsules. In midsummer the leaf and the capsule of *V. Novae-Angliae* naturally attain to a greater development than is indicated in Mr. House's dimensions, and the leaf loses the thinness of texture of which he speaks.

In addition to the type specimens from Fort Kent, Mr. House has cited as referable to this species specimens from four other stations. The St. Francis plant is unquestionably the same, growing along the same river fifteen miles farther up. But the plant from Orono, Maine (no. 2256 Fernald) is surely to be otherwise disposed of; as Mr. House would have doubtless himself admitted, had he seen the plants collected from the same station the following September. Oddly enough, this is one of the plants cited by me in RHODORA (vi. 216) as *V. septentrionalis*  $\times$  *fimbriatula*, growing with the parent forms. Not only are the leaves of this much wider than in *V. Novae-Angliae* and the sepals ciliate; but also some of the cleistogamous capsules are quite green as in *V. fimbriatula*, and all more or less sterile. In fact, the Orono specimens are quite like Mr. Mathews's excellent drawing of this hybrid.<sup>1</sup> (RHODORA, Plate 58, fig. a.)

<sup>1</sup> The above comment was based upon specimens of Mr. Fernald's no. 2256 in the Gray Herbarium. Since, I have been able through the courtesy of Dr. Rose to examine the sheet of this seen by Mr. House in the National Herbarium. It is interesting to note that two of the four plants there shown are the above named hybrid; but closely intermingled with them are two plants of *V. septentrionalis*, one of the parent forms. It may be readily distinguished from the hybrid by the broader leaf, scantier pubescence, and the notably less conspicuous stipules.

The plant from Bridgeport, Connecticut, is also in my judgment incorrectly referred to *V. Novae-Angliae*. The fact that the two stations are at the opposite ends of New England, 500 miles apart, is suspicious. But the leaves of Dr. Eames's plant are much wider and less cordate at the base than Mr. Fernald's; the sepals are narrowly lanceolate, some of them ciliate and with long hispidulous auricles, betraying, to my mind, traits inherited both from *V. cucullata* and from *V. fimbriatula*. In short, the plant is the same, so far as the characters are developed in the vernal stage, as those that I have regarded (RHODORA, vi. 217, 218) as resulting from a cross between these two species. The hybrid proves to be not uncommon in southern Connecticut, as I have received it recently from three stations other than those cited in RHODORA.

The remaining plant referred to *V. Novae-Angliae* by Mr. House was collected by Mr. Pollard on the Blue Hill Reservation near Boston. In leaf-outline these specimens have a closer resemblance to the Fort Kent plant than have those from either Bridgeport or Orono; but in fact they are only small seedlings of *V. fimbriatula*. Two of these young plants at the date of collection, Aug. 24, had already produced cleistogamous flowers, but the two green capsules shown are borne on erect peduncles 6–7 cm. long, not on "short horizontal" ones, "1.5–2.5 cm. long," as in *V. Novae-Angliae*. The slender sepals, the long somewhat hispidulous auricles, the denser pubescence, the relatively shorter leaf-blades, the more obscure crenation, all point to *V. fimbriatula*.

The new species, then, seems to be known only from the two stations along the River St. John, on the northern boundary of Maine. Judging from its associations and its affinity to *V. septentrionalis*, it is more likely to be found hereafter northward or eastward, in Quebec or in New Brunswick, than southward in New England as a whole. The name *V. Novae-Angliae*, consequently, turns out to be somewhat unfortunate.

The other new species of *Viola* for northern New England is more widely distributed. It has been found at four stations in Maine and four in Vermont,—in mossy bogs, along streams in silt or gravel, or in the wet debris of cliffs. It is ordinarily a small plant, in its vernal state not easily distinguished from *V. affinis*; but later it develops leaves that are broader than in that species, less conspicuously crenate, and cleistogamous fruit that is green instead of purple. In



these respects it approaches *V. cucullata*,—so much so that on my first acquaintance with the plant in August, 1903, I queried if it might not be a hybrid between this and *V. affinis* which were growing with it. However, the violet color of the petals, the obtuse sepals, the constant green of the capsules and the absence of all indications of sterility convinced me during the past season that the plant was a valid species, answering well to the description of *V. vagula*, Greene (Pitt. iv. 67). As no type of this species was extant, one of the chief objects of a visit to Ottawa last September was to observe this plant in the original station. Under the courteous guidance of Dr. James Fletcher this was accomplished. The station is a flat, boggy "beaver-meadow" across the Ottawa River in Hull, Quebec, and the plant has proved to be identical with those from Vermont and Maine.

But the species is found to extend across the Dominion of Canada from Eastern Quebec at least to the Rocky Mountains. Mr. Fernald collected it the past summer at seven stations along various rivers of the Gaspé Peninsula. Mr. A. B. Klugh has sent it to me from near Guelph in western Ontario. In the Gray Herbarium there are specimens from Saskatchewan and from Assiniboia; and in the National Herbarium a fine sheet from Banff, Alberta, showing the plant both in petaliferous flower and in its late summer stages with characteristic leaves and fruit. Furthermore, the species is found to extend southward in the Rocky Mountain region at least into Colorado. The large herbaria at Washington, New York and Cambridge show that the plant is common in all the mountainous States of the northwest, the specimens collected of late years passing usually under the name of *V. cognata*, Greene, or *V. nephrophylla*, Greene.

Through the great kindness of Professor Greene the type specimens of these two species have been sent me for study. They were collected by Professor Greene himself in the summer of 1896, — *V. nephrophylla* at Cimarron River in western Colorado, and *V. cognata* at Dale Creek, about 200 miles to the northeast, on the southern borders of Wyoming. The latter was in the advanced stages of petaliferous flowering, the thirteen plants preserved showing eight cleistogamous ovoid flowers on slender ascending or horizontal peduncles 2–4 cm. long. The petals are all more or less hairy; the sepals ovate or oblong, obtuse; the later leaves, cordate, obtuse, obscurely crenate, glabrous. In all these characters the plants closely resemble the eastern specimens collected at that stage of growth.



The type of *V. nephrophylla* consists of fourteen plants collected two months later, August 29. They display numerous cleistogamous capsules in various stages of growth, the mature ones being oblong, green, 6–8 mm. long, bearing oblong obtuse sepals half the length of the capsule. Several of the plants also bear on peduncles (2–4 cm. long) reduced petaliferous flowers, which cannot be regarded as a remnant of the vernal crop, but as an occasional autumnal development, not rarely observed in other species of violets. Indeed, Dr. Fletcher and myself found two such flowers with half-developed petals at the type station of *V. vagula*, September 3d. The leaves of *V. nephrophylla* are broadly cordate, obtuse or with a short blunt apex, obscurely crenate, glabrous (save a few minute stiff hairs on the upper surface of some of the basal lobes), 2–5 cm. wide, except that in one large plant the width of 6.8 cm. is attained. In all these particulars the eastern plants under discussion in their autumnal stage are an excellent match for *V. nephrophylla*. In spite of a marked difference in aspect of these two western types, I am forced to regard them as representing only one species, collected first in its vernal state, and afterward in its late summer development.

It should not surprise us to find a northern species of *Viola* extending through such a wide range of longitude. There are a hundred or more boreal species occurring in the northern Rocky Mountains, and also in northern New England or in eastern Canada; and fresh researches are yearly adding to the list.<sup>1</sup> Among these additions it is interesting to find this distinct violet, of which I venture to set forth the following description:

*VIOLA NEPHROPHYLLA*, Greene. Glabrous, but under a lense often disclosing minute stiff white hairs on the upper surface of æstival leaves, and occasionally on petioles and veins beneath; earliest leaves orbicular or slightly reniform, later leaves cordate-deltoid or broadly cordate, obtuse, obscurely crenate-serrate, 3–6 cm. wide; flowers violet, on peduncles exceeding the leaves, spurred petals

<sup>1</sup>As illustrating the points of identity in these two floras, I would cite on Mr. Fernald's authority: *Anemone parviflora*, *A. multifida*, *Thalictrum alpinum*, *Ranunculus Macounii*, *R. Purshii*, *Astragalus elegans*, *A. frigidus*, var. *Americanus*, *Dryas Drummondii*, *Parnassia parviflora*, *Epilobium latifolium*, *Lonicera involucrata*, as characteristic plants of the river-valleys where *V. nephrophylla* abounds in Eastern Quebec. In one section alone of *Carex* (*Hyparrhenae*) I count twenty-one species common to the two regions in which *V. nephrophylla* is found.

somewhat bearded, the lateral densely bearded, and often the two upper with scattered hairs; sepals ovate to lanceolate, obtuse or often rounded; cleistogamous flowers on short and recurved or prostrate peduncles, ovoid, producing green oblong capsules 5-8 mm. long.—Pitt. iii. 144; *V. cognata*, Greene, Pitt. iii. 145; *V. vagula*, Greene, Pitt. iv. 67.—The eastern stations from which the species has been seen are the following: QUEBEC; Hull, 1898, *J. M. Macoun*; Gaspé Co., banks and gravel beaches of Grand and Dartmouth Rivers; Bonaventure Co., along the Restigouche, Escuminac, Bonaventure and Little Cascapedia Rivers, June 28-Aug. 27, 1904. *M. L. Fernald*. MAINE: Fort Fairfield, river-beach, June 5, 1901; Masardis, abundant on ledgy river-bank, Sept. 8, 1897; Blaine, arbovitae swamps, in sphagnum, June 23, 1898, no. 2255, and June 7, 1901; Winslow, rocky shore of Kennebec River, Sept. 2, no. 2626, & wet calcareous cliffs, Sept. 3, 1898, no. 2612, *M. L. Fernald*. VERMONT: wet slides of Willoughby Mt., June 2, 1892, July 18, 1896, & May 26, 1901, *G. G. Kennedy*; May 27, 1903, *W. W. Eggleston*; Aug. 30, 1904, *Annie Lorenz*<sup>1</sup>; New Haven, shady border of bog, Aug. 14, 1903, & May 18, 1904; Middlebury, river-border under alders, 1904; Manchester, wet mossy meadow and in moist loam along a brook, Sept. 26, 1904, *Ezra Brainerd*. ONTARIO: Wellington Co., open springy ground near Puslinch Lake, May 15, & 17, 1904, *A. B. Klugh*.

There are indications that in southwestern New England we may have two more species, hitherto recorded only from the Middle States. Dr. E. H. Eames has collected in the vicinity of Bridgeport, Connecticut specimens that Mr. Pollard has pronounced to be *V. villosa*, Walt; and Profr. Greene asserts (Pitt. iii. 313) that *V. emarginata* "is known to me as occurring as far northeastward as the vicinity of New York City." The latter species is, indeed, too vaguely apprehended. The specimens under covers so labeled are in many herbaria a medley of odd things, from such a plant as *V. Novae-Angliae* to others with broad deeply lobed leaves, as figured by Mr. W. Stone (Proc. Acad. Nat. Sci. Phila. 1903, Pl. 36. v.). But aside from these aberrant forms, that require prolonged and critical study of the living plant, it may be presumed that there is a "typical" *V. emarginata*, such as is figured in the Britton Illustrated Flora (iii. 520).

In view of these additions and the clearer knowledge that has come from another season's field work, I desire to present the following revised synopsis of our blue stemless non-stoloniferous

<sup>1</sup> These plants, through an error of mine, were called *V. venustula* in Dr. Kennedy's Flora of Willoughby (RHODORA, vi. 123).

violets. *V. pedata* is in a class by itself, having no bearded petals and no known cleistogamous flowers. The other species I would arrange according to their natural affinities as follows:—

KEY TO THE BLUE ACAULESCENT VIOLETS OF THE NORTHEASTERN UNITED STATES.

- I. Peduncles of cleistogamous flowers decumbent or declining.
- A. Cleistogamous flowers ovoid or ovoid-acuminate; auricles of sepals short, appressed.
- a. Leaves cordate, glabrous, 2–6 cm. wide; petals violet, spurred petal somewhat bearded; cleistogamous capsules usually growing above ground, subglobose or oblong, 5–8 mm. long; sepals half the length of capsule.
- \* Aestival leaves not acuminate, obscurely crenate; cleistogamous capsules green, bearing broadly ovate to lanceolate usually obtuse often rounded sepals. (1) *V. NEPHROPHYLLA*, Greene.
- \* \* Aestival leaves acuminate, conspicuously crenate-serrate; cleistogamous capsules purple, bearing lanceolate attenuate sepals.
- (2) *V. AFFINIS*, LeConte.
- b. Leaves broadly cordate, or lobed in (6), 4–12 cm. wide; spurred petal almost or quite beardless except in (3); cleistogamous capsules often underground until mature, oblong, 8–15 mm. long; sepals ovate-lanceolate, one-quarter to one-third the length of capsule.
- \* Plants nearly or quite glabrous; petals violet; cleistogamous capsules usually pale green.
- † Vernal leaves purple beneath; aestival leaves often broadly deltoid or with concave edges toward the apex.
- (3) *V. LATIUSCULA*, Greene.
- †† Vernal leaves green beneath; aestival leaves rounded above the base or the apex but slightly produced.
- (4) *V. PAPILIONACEA*, Pursh.
- \* \* Plants more or less villous-pubescent; petals commonly light blue or lavender; cleistogamous capsules usually purple.
- † Leaves never lobed. (5) *V. SORORIA*, Willd.
- †† Leaves more or less lobed. (6) *V. PALMATA*, L.
- \* \* \* Upper surface of leaves hispid-pubescent; petals reddish purple.
- (7) *V. VILLOSA*, Walter.
- B. Cleistogamous flowers sagittate, producing short-obovate or subglobose usually purple capsules 4–7 mm. long; auricles in fruit long, spreading; petioles veins and margins of leaves hirsutulous; petals violet, spurred petal bearded.
- a. Leaves cordate, 4–7 cm. wide; sepals and their auricles ciliolate.
- (8) *V. SEPTENTRIONALIS*, Greene.
- b. Leaves narrowly cordate-deltoid, 2–3.5 cm. wide; sepals and auricles not ciliolate. (9) *V. NOVAE-ANGLIAE*, House.
- II. Peduncles of cleistogamous flowers erect; their capsules oblong, green, bearing lanceolate to narrowly lanceolate long-auricled sepals.
- A. Spurred petal bearded; cleistogamous flowers sagittate.
- a. Leaves pubescent, ovate-oblong, often coarsely toothed at base; petals purple. (10) *V. FIMBRIATULA*, J. E. Sm.
- b. Leaves nearly glabrous, lanceolate, basal lobes prominently toothed or incised; petals purple or violet. (11) *V. SAGITTATA*, Ait.
- c. Leaves nearly glabrous, deltoid, basal lobes finely toothed or incised; petals ~~blue~~ *violet*. (12) *V. EMARGINATA*, LeConte.
- d. Leaves nearly glabrous, deeply lobed or parted.



- \* Leaves truncate at base or subcordate, slightly decurrent, middle lobe usually the widest, segments 7-9; petals violet.  
(13) *V. SEPTEMLOBA*, LeConte.
- \* \* Leaves decurrent on petiole, flabellately veined at base, segments of nearly equal width, 9-15; petals blue.  
(14) *V. PEDATIFIDA*, Don.
- B. Spurred petal beardless; cleistogamous flowers subulate; leaves cordate, glabrous; petals pale blue, darker towards the throat.  
(15) *V. CUCULLATA*, Ait.

MIDDLEBURY COLLEGE.

## A PECULIAR VARIETY OF *DROSERA ROTUNDIFOLIA*.

M. L. FERNALD.

IN August, 1904, the marly sphagnous bogs at the mouth of the Grand River, Gaspé County, Quebec, were found by Messrs. J. F. Collins, A. S. Pease, and the writer to be the home of many remarkable plants, among others three *Droseras* which are little known to American botanists. One of the bogs had its open marly spots almost given over to four plants, *Drosera linearis*, Goldie, *D. longifolia*, L. (*D. anglica*, Hudson), *Juncus stygius*, var. *americanus*, Buchenau, and *Pinguicula vulgaris*, L., though other species, there less abundant, were quite at home in the calcic carbonate.<sup>1</sup> On the mossy knolls at the borders of the open marl normal *Drosera rotundifolia* was abundant.

Soon after the exploration of this bog, another, perhaps a mile distant, was visited. On entering the bog a tiny inflorescence was noticed, so strange in appearance that at first sight it was taken to be the unique *Saxifraga stellaris*, var. *comosa* of Mt. Katahdin. Instead, however, the plant proved to be a peculiar dwarf variety of *Drosera rotundifolia* with subcapitate inflorescences of few flowers, the petals colored, and the ovary instead of producing normal capsules, tending to develop into a rosette of glandular foliage-leaves. This tendency was also noted in other floral organs, but it was most apparent in the carpels.

Examination of the bog showed that the anomalous *Drosera* was abundant in the wet portion between the central pond and the higher

<sup>1</sup> An analysis of soil from a similar bog in Aroostook Co., Maine, shows it to contain nearly 96 % of calcic carbonate.

arbor-vitæ forest, occupying an area of perhaps a half acre. Occasional normal plants of *Drosera rotundifolia* were found but these were always taller and coarser and far less abundant than the plant with foliaceous carpels. That this little plant maintains its peculiar character was shown not only by its distribution throughout one end of the bog, but by the shrivelled remnants of similar inflorescences on scapes produced in past years.

Whether the plant reproduces itself by means of the peculiarly developed carpels cannot now be stated. Living material now being studied at the Ames Botanical Laboratory and forming the basis for Dr. Leavitt's notes on page 14 will doubtless demonstrate this point. The plants, however, are not without their own method of abundant reproduction, for many of the specimens showed, springing from the decaying leaf-blades or the injured petioles, young plants such as have been already described by various observers.<sup>1</sup>

The dwarf plant perpetuating itself and occupying a considerable area almost to the exclusion of normal *Drosera rotundifolia* may be called

*DROSERA ROTUNDIFOLIA*, var. **comosa**. Dwarf, the scapes 2 to 8 cm. high: leaves comparatively small, the blades 3 to 7 mm. long: inflorescence 1- to few-flowered, subcapitate: calyx crimson or roseate: petals greenish to crimson, sometimes foliaceous: carpels in maturity developed into green glandular broadly obovate or oblate petioled leaves: other portions of the inflorescence occasionally modified. — Wet boggy margin of a marl-pond, near the mouth of Grand River, Gaspé County, Quebec, August 13, 1904 (*J. F. Collins, M. L. Fernald and A. S. Pease*). Type in Herb. Gray.

GRAY HERBARIUM.

## IDENTITY OF PRICKLY LETTUCE.

LYSTER H. DEWEY.

THE earliest authentic records that we have of the presence of prickly lettuce in this country are three specimens collected in 1863 and 1864, in the vicinity of Cambridge, Massachusetts, and now in

<sup>1</sup> See Bull. Torr. Cl. xix. 295; RHODORA, i. 172, pl. 8; 206, pl. 10.

the Gray Herbarium of Harvard University. These were identified as *Lactuca scariola* L., and a description of the plant under this name appeared in the 5th edition of Gray's Manual, published in 1868. From 1880 to 1885 the plant was reported from several localities in Ohio, Indiana, Illinois and southern Michigan. It seems probable that there were several independent introductions of the seed mixed with poorly-cleaned field seeds. It became abundant in the regions where clover seed and grass seed are largely produced, and then its distribution rapidly increased. Within 30 years from the date of its first recorded appearance in this country it had reached every state and territory in the land, and in many localities it quickly came to be recognized as the most prolific and aggressive weed that the farmers had ever been troubled with. From 1893 to 1897 most alarming reports in regard to it were received at the Department of Agriculture. In some instances it was stated that valuable farms would have to be abandoned unless some means could be devised for keeping it in check. The danger period seems now to be past. The prickly lettuce has either found natural enemies which keep it in check, or for some reason it has lost much of its aggressive character. It is becoming much less abundant in regions where it formerly occupied nearly all the waste land and many of the cultivated fields, and the individual plants are generally less robust and less prolific than they were six to ten years ago.

All of the scores of specimens of the weed examined agreed with each other in their essential characters, and all were called *L. scariola* until within the past three years. In August, 1901, a specimen was received at the Department of Agriculture for identification, from Plainville, Hamilton Co., Ohio. This specimen differed from all others that had been examined in having runcinate or pinnately-lobed leaves. A careful study of the early descriptions proved that this form must be the true *L. scariola*, of Linnaeus. If this was *L. scariola*, the common form with unlobed leaves certainly was not, and for the first time in its history of nearly 40 years as a weed in this country its real identity became a matter of importance. A reference to the descriptions of *Lactuca* given by Linnaeus, and to some of the plates referred to, seemed to indicate that it was *Lactuca virosa* L. This is one of the species included with *L. scariola* by most English authors, who regard it as an entire-leaved form of that species. Dr. Britton's Manual of the Flora of the northern States and



Canada was in press at the time the specimen from Ohio was being studied. Attention was called to the misidentification of the plant, and *Lactuca virosa* was inserted in the appendix.

Since then the writer has examined several specimens from the Gray Herbarium and all of the *Lactucas* in the Herbarium of the Missouri Botanic Garden, and also in the Herbarium of the Field Columbian Museum as well as the U. S. National Herbarium. These collections include several European specimens of both *L. virosa* and *L. scariola*, the correct identification of which is not to be doubted. These two species are abundantly distinct, but our common prickly lettuce does not agree with typical forms of either species.

There was one specimen from the Gray Herbarium agreeing perfectly with our common form with merely dentate leaves, and labeled *L. scariola integrata*, Gren. et Godr. A further study of specimens and descriptions seems to prove that this is the correct solution of the three-cornered puzzle. The common prickly lettuce, having leaves without lobes, is *L. scariola integrata*, Gren. et Godr. Fl. France, 2: 320, 1850. The true *Lactuca scariola* is rare in this country, except in the central Ohio valley and *Lactuca virosa* is not found here at all.

The original description of *Lactuca virosa* in Linnaeus Species Plantarum<sup>1</sup> included also *L. scariola* and two illustrations are referred to in Morrison's Historia. One of these figures shows a plant with merely dentate leaves and the other with lobed leaves. Three years later Linnaeus published in Centuria II<sup>2</sup> his description of *L. scariola* referring to the figure with lobed leaves in Morrison's Historia, and furthermore stating that *L. scariola* "differs from *Lactuca virosa* (from which it is to be distinguished) in the vertical not horizontal plane of its leaves." The leaves of both forms in this country are turned in a vertical plane, and also to the north and south, when the plants grow in the open so that they are exposed to the light.

The true *Lactuca scariola* has been collected on ballast at New York, on the site of an Italian railway construction camp in Washington, and in Ohio, Indiana and Kentucky it is abundant within a hundred miles of Cincinnati. In Washington it does not spread, although the variety *integrata* is an aggressive weed there.

Aside from the leaves there seem to be no characters distinguishing the species from the variety, and a few specimens among the

<sup>1</sup> Sp. Pl. 795 (1753).

<sup>2</sup> Centuria II (1756). Reprinted in Amoen. Acad. 4: 328 (1759).

large number examined show some intergradation. Intergrading forms have been observed growing together at Lexington, Ky.

The principal distinguishing characters of the three forms are pointed out in the following descriptions:

*Lactuca virosa* has oblong-obovate obtuse leaves, rather thin and weak in texture and inclined to be bullate. So far as can be determined in pressed specimens they are horizontal. The achenes are black or very dark, with a comparatively short stout beak.

The leaves of *L. scariola* are runcinate, or pinnately lobed, firm in texture and with or without spines on the back of the midrib. They are turned in a vertical plane. The flowers are smaller than those of *L. virosa* and the achenes, also smaller and more slender, are light brownish-gray, usually mottled and with long slender beaks.

The leaves of *L. scariola integrata* have nearly parallel margins, with usually a broadly deltoid acute apex, and a firm texture. They are turned in a vertical plane and the midrib is either with or without spines. The flowers and achenes do not appear to differ from those of the species.

The flowers of both the species and the variety are yellow, but in the dried herbarium specimen they change to blue.

WASHINGTON, D. C.

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LEDUM PALUSTRE, var. DILATATUM ON MT. KATAHDIN.—While examining with Professor E. B. Delabarre some Labrador material of *Ledum palustre*, L., and its var. *dilatatum*, Wahl., I was surprised to find in the Gray Herbarium a beautifully fruited specimen of the characteristic var. *dilatatum* collected by the late George Thurber on the summit of Mt. Katahdin, Maine, in August, 1847. The Thurber sheet is labeled "woods & summit of Katahdin, Me.", and contains two branches; one, a loosely forking branch of typical fruiting *L. groenlandicum*, apparently from "woods," the other, a dwarfed and small-leaved branch of heavily fruited *L. palustre*, var. *dilatatum*, obviously from the "summit."

*Ledum palustre* of Arctic regions presents two strongly marked variations, the true *L. palustre* with narrowly linear rigid leaves 1 to 3 cm. long, and the var. *dilatatum* with leaves linear-oblong as in *L. groenlandicum*. From the latter species of Greenland and boreal America, which commonly has 5 to 7 stamens and narrowly oblong or

cylindric capsules, both *L. palustre* and its variety differ in having more stamens, commonly 7 to 11, and ellipsoid-ovoid shorter capsules. *L. palustre*, var. *dilatatum*, extends south to Newfoundland, has recently been found by Mr. F. F. Forbes in Matane County, Quebec, and is probably the form reported by some authors from the Great Lakes. Its presence on Mt. Katahdin indicates that careful search may show it on other New England mountains.—M. L. FERNALD.

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FURTHER NOTES ON *ARABIS LAEVIGATA* AND *ASPENIUM TRICHOMANES* IN MAINE. — May I venture to correct Mr. C. H. Knowlton's statement, RHODORA 6, 208, that *Arabis laevigata*, Poir., had previously been reported only from North Berwick? The plant has never, in my knowledge, been collected in North Berwick. In South Berwick, I have found it at two stations: in company with Mr. M. L. Fernald, on 13 June, 1895, I found a considerable quantity of it along the cliff forming the western side of "The Gulf," and have since collected it there several times; I have also collected it on the ledges around the Parker granite quarry. Both stations are in the "Tacnic," or "Tatnic," region in the northeastern part of the town. Geographically, the difference in location is slight; but it may be of service to some other collector to know the exact locality, as the only place in North Berwick where one would think of looking for plants of similar habitat is Bauneg Beg Hill, some eight miles away in the extreme northern section of the town.

*Asplenium Trichomanes*, L., noted by Mr. Knowlton from Livermore, also grows on dry shaded ledges near Rumford Falls (*W. H. Allen & J. C. Parlin*).—J. C. PARLIN, Brownville, Me.

## ON TRANSLOCATION OF CHARACTERS IN PLANTS.

R. G. LEAVITT.

SEVERAL monstrous forms exhibited by native plants have been shown me lately by members of the New England Botanical Club. A consideration of the possible meaning of the anomalies has led to certain suggestions, which, if correct, are widely applicable. The



instances first to be described seem to me to point to a principle in the operation of the plastic forces, which the illustrations adduced in the later portion of this paper<sup>1</sup> tend to confirm as a principle of normal evolution.

AN ANOMALOUS *GENTIANA CRINITA*. — About September 10th, 1903, Miss F. C. Prince collected at Petersham, Massachusetts, a branch of the Fringed Gentian. It bore several blossoms, one of which Miss Prince found to be abnormal. The flower was sent to the Gray Herbarium, where it was turned over to me for examination and remark. The abnormality pertains to the gynoecium alone. There are three pistils. One, centrally placed, is normal. The two supernumerary ones, somewhat smaller than the first, arise from the receptacle. One of them consists of but a single ovuliferous carpel — the normal condition is bicarpellary — dilated above to form the usual stigma. It is not closed; the ovules are, therefore, exposed. The other supernumerary pistil is bicarpellary, but the carpels are united to less than half the height of the ovary. One of them bears a normal stigma. The other is remarkable in being petaloid — though ovuliferous — especially above the point at which the carpels cease to be united. The petaloid character is seen not only in the texture and veining, but most strikingly in the border of the organ, which is fringed in precisely the same manner as are the lobes of the corolla. The correspondence of the fringe of this carpel with that of the corolla extends to details of length and shape of segments, and relation of the segments to the veins. These facts will be of value when we come to consider the significance of the abnormality.

*DROSERA ROTUNDIFOLIA*. — Last summer Mr. Fernald sent me from Grand River, Gaspé Co., Quebec, a number of live plants of the common Sundew. The inflorescences which they bear are few-flowered and capitate, and the flowers themselves are quite sterile. The perianth, and in many cases the carpels, are aberrant, having, with little increase in size, taken on approximately the form of the foliage leaves of the species. The glandular tentacles peculiar to the genus are present in many instances both on the perianth and on the transformed carpels. Sometimes the latter are found to be conjoined at the base to form a short tube, representing the normal ovary. Above this tube the carpels are dilated, rotund, and tentaculiferous.

<sup>1</sup> Contributions from the Ames Botanical Laboratory, No. 3.

I have examined the tentacles with care and ascertained that they have the microscopical structure of tentacles of the foliage leaves. Those of the disc terminate in capitate glands; those of the margin, in linear or spatulate expansions supporting the elongated glands on the upper surfaces. Thus the state of affairs found in the vegetative leaf is exactly reproduced. Here again to be borne in mind is a detailed correspondence between abnormal characters of the modified member and normal characters of another part of the plant.

A parallel anomaly in *D. intermedia* was described by Planchon in his monograph of the Droseraceae.<sup>1</sup> Carpels became leaf-like in the way described above for *D. rotundifolia*. In one case a foliar member of the flower evinced its carpellary nature in a terminal style-like structure, cleft and bearing stigmas. Planchon observed anomalous structures which seemed intermediate between hairs [tentacles] and ovules; that is, they combined features peculiar to ovules with others characteristic of Droseraceous tentacles. Similarly formations mingling the characters of tentacle and style were found. Discussing the meaning of these confused forms Planchon says: "Although conclusions as to the normal state of organs, to be drawn from teratological facts, are more liable than any others to take the turn which the imagination would lend them, it is none the less certain that the study of them alone is able to give the key to a thousand interesting problems. To say, for example, that hair [tentacle], ovule, and style are (in certain cases) different names for the same organ, of which the form and functions are modified, is to advance a kind of paradox; and yet this is nothing less than one of the consequences of the natural facts which have just held our attention."

*SAXIFRAGA VIRGINIENSIS*.—For several seasons Mr. J. H. Sears of the Peabody Academy of Sciences at Salem, Massachusetts, has found at a certain station in Essex a singular form or variety of the common *Saxifraga* in which the petals are replaced by stamens. Normal specimens have ten stamens and five petals. Mr. Sears's plants have fifteen stamens, of which five stand in the places of the absent petals. In current phrase petals have been transformed into stamens. This kind of abnormality, termed by teratologists staminody, is of rather rare occurrence. One of the few reported cases is

<sup>1</sup> Ann. Sci. Nat. Bot. sér. 3, 9: 84.

that of a congener of *S. virginiensis*, namely *S. granulata*. Staminody has also been observed in *Yucca*, *Asphodelus*, *Digitalis*, *Capsella*, and *Phaseolus*. For the present species, *Saxifraga virginiensis*, it was described by Sterns<sup>1</sup> in 1887 from a colony of plants found on Manhattan Island. As Sterns judged that the anomaly is propagated by seed, he proposed to establish a variety, *S. virginiensis*, var. *pentadecandra*. In some of his plants the stamens were deformed and occasionally pistiloid. Going on to discuss the meaning of the perverted forms, the author says: "Is this identity of variation in *S. granulata* and *S. Virginiensis* a mere coincidence? Or have we here a striking case of atavism? Is this variation the recurrence, in the descendants, of the peculiar and long obsolete structure of their common ancestor? Was the progenitor of the hundred and sixty or more distinct *Saxifragae* of to-day a plant with apetalous and fifteen-stamened flowers? We shall never know with certainty, but two of its descendants testify strongly in the affirmative. I would even go a step farther, and hazard the conjecture that the original of the *Saxifrages* was dioecious, or at least polygamous. In the two perfect plants I have described the stamens were remarkably vigorous and well developed. In the ten or more others the stamens, as I have said, were singularly imperfect, and numbers of them were curiously ovary-like in appearance. Is it possible that these plants were blindly struggling to reproduce a primitive pistillate form?"

THE SIGNIFICANCE OF MONSTROSITIES.—Much attention has been given to monstrosities, and the literature of the subject is vast. A cursory résumé of it, up to 1890, occupies some 1106 pages in Penzig's useful *Pflanzenzeratologie*. The voluminousness of the record is attributable, first, to the interest excited in observers by the unexpectedness of the phenomena; secondly and more significantly, to a more or less conscious assumption, widely entertained, that the apparent vagaries of nature when rightly understood will throw much light upon the morphological nature of normal plant structures and the modes of evolution.

WHAT KINDS OF SIGNIFICANCE MAY MONSTROSITIES BE DEEMED TO POSSESS? — It is evident that every formation of the plant body, whether normal or abnormal, is an expression of the physiological forces operative in growth. The occurrence of an aberrant form

<sup>1</sup> Bull. Torr. Bot. Club, 14 : 122 (1887).



denotes disturbance of the ordinary physiological factors. In the present paper it is not meant to inquire what the nature of this disturbance is. It is intended to ask only what application teratology may have to the problems of evolution. The answer which, in effect, has been made is this, that teratological phenomena bring us desired information from at least two different sides. In the first place, abnormalities have often been held to represent the restoration of ancient forms and to reveal the original condition of organs; certain abnormalities, in other words, have been regarded as displays of atavism. When this is their true nature they show us certain definite points which lines of evolution have followed. The remarks of Planchon and of Sterns quoted above exemplify this concrete application of the phenomena. Interesting attempts to use teratological forms in the interpretation of normal structures, wherein the atavistic nature of the occurrences is assumed, are to be found in the controversies regarding the morphology of the ovuliferous scale of the Abietaceae; in discussions of the origin of the Angiospermous ovule; and recently in Dr. Davis's attractive elucidation of the derivation of the archegonium.<sup>1</sup>

Secondly, abnormality as a general broad phenomenon has, especially of late, attracted to itself a strong current of biological thought, by reason of its relation to the ideas of "discontinuous variation" and "mutation." An original, suggestive, and philosophical treatment of monstrosity in general, considered broadly as a phase of organic development, and in its bearing on evolution, is the work of Casimir de Candolle.<sup>2</sup> He recognizes the parallelism between certain types of abnormal deviations and certain demonstrable trends of evolutionary progress in flowering plants. It is worth while to quote the concluding sentences of the essay mentioned. "If teratological variations of floral organs have played a rôle in past evolution, those which have led to present complex forms are to day the rarest, while the monstrosities now the most common indicate, in phanerogams at least, a tendency toward primitive simplicity of forms. Consequently if progressive taxonomic monstrosities of the flower were not in other times more frequent and especially more varied than they are to-day, they could not have produced, by the sole effect of natural selection,

<sup>1</sup> Ann. Bot. 17: 477 (1903).

<sup>2</sup> Arch. Sci. Phys. et Nat. Genève, Mar. 1897.

that evolution which is regarded as having eventuated in the most complex floral structures of our times." From such studies of abnormality as De Candolle has made the fullest significance of teratological formations is to be gathered.

SO-CALLED REVERSIONS AMONG MONSTROSITIES.—Such malformed carpels as those of Mr. Fernald's *Drosera* are not infrequently spoken of as reversions. But the term reversion itself is to be understood in at least two senses. As Gray's *Structural Botany* has been the schoolmaster to bring most of us to the study of morphology, and as the treatment of floral malformations in that work has probably been misunderstood, Dr. Gray's attitude had best be defined.

DR. GRAY'S VIEWS OF REVERSIONARY MONSTROSITY.—In the *Structural Botany* Dr. Gray says that in the vegetable kingdom monstrous forms often elucidate the nature of organs. Three pages are therefore given to the subject.<sup>1</sup> Abnormal forms are introduced as one of the two chief kinds of evidence upon which we may rest the doctrine of the unity of type existing among all kinds of foliar appendages of the stem. The readiness with which essential organs are transformed to petals and even to vegetative leaves appears to Dr. Gray to show that stamens, carpels, and foliage leaves are homologous. "The commonest of these changes [abnormalities] belong to what was termed by Goethe *retrograde metamorphosis*; that is, to *reversion* from a higher to a lower form, as of an organ proper to the summit or center of the floral axis into one which belongs lower down."

The use of the word "reversion" and the statement that essential organs of the flower and foliage leaves are homologous, appear at first sight to represent the abnormalities in question as reversions in the phylogenetic sense. To take the words in this sense would, however, be to attribute to Dr. Gray a view which he has not maintained in the *Structural Botany*. When we seek for definitions of homologous, we find a studious avoidance of any suggestion of historic community of origin for homologous structures. *Homologous* is defined as being "of one name or type," i. e. "ideal plan or pattern." Organs are homologous with leaves which "accord with leaves in mode of origin, position and arrangement on the axis or stem." When, therefore, abnormal flowers show that pistils and stamens are the homologues of leaves they merely demonstrate that

<sup>1</sup> *Structural Botany*, pp. 171-173.

these organs accord with leaves in mode of origin, position and arrangement; or at most that they are of one name, ideal plan, or pattern. There is no implication of common historic origin. Similarly "reversion" means in Dr. Gray's language no more than descent in the scale of forms subsumed under the ideal conception or type, Leaf. "The substance of the doctrine [Goethe's doctrine of metamorphosis] is *unity of type*" (p. 169). Dr. Gray's "reversion" is the "retrograde metamorphosis" of Goethe.

In the section on monstrous floral structures Dr. Gray uses the word reversion in this abstract sense, with no connotation as to the phylogenetic derivation of the organs in question. This attitude is betrayed by the expression (p. 172) "the reversion of the pistils to stamens." The author of the *Structural Botany* could not have held that pistils have been derived historically from stamens. His presentation of the teratological facts, however, is entirely permissible if the word reversion is understood in the older sense. Throughout the section on the morphology of the flower, Dr. Gray's position is that of Wolff, Goethe and De Candolle, whose researches, with the later investigations of phyllotaxy, Dr. Gray holds to have completed the evidence of the morphological unity of foliaceous and floral organs (p. 168). While at the present time we may safely enlarge our definition of homologous; and while the conclusion that floral appendages and vegetative leaves are homologous rests on a basis far broader than that of phyllotaxy, transition and "retrograde metamorphosis," yet Dr. Gray's treatment of monstrous forms is unimpeachable. He does not venture far into a field in which he doubtless descried numerous pitfalls.

However, the employment of the word reversion by the older writers has doubtless contributed to the confidence with which some subsequent authors have given utterance to unwarranted interpretations. Observers of to-day are imbued with the ideas of the descent theory; they have taken up the term "reversion" and have applied it in a new way in consonance with modern evolutionary ideas. Their reversions are therefore, as they suppose, genuine reappearances of ancestral traits, or restoration of organs to conditions from which they have departed in the course of evolution.

(To be continued.)

ARENARIA MACROPHYLLA IN CONNECTICUT.—*Arenaria macrophylla*, Hook. was found by the writer in full flower on May 22d last, growing in the thin soil covering trap stones on the eastern slope of Bluff Mountain in North Guilford, Connecticut, about ten miles from the coast and at an altitude of four hundred feet. Three weeks later it was fruiting freely, the flowers having all disappeared. Only a small patch was observed in a little open slightly grassy place, partly in shade of White Pine and some small deciduous trees. The petals are a little longer than the sepals, otherwise it corresponds to the description in Britton's Manual and with specimens of the same plant collected by W. W. Eggleston, in Proctorsville, Vt., which is believed to be the only other reported New England station. The Connecticut station seems to be decidedly out of, and much South of its hitherto known range. — GEORGE H. BARTLETT, North Guilford, Connecticut.

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A CONNECTICUT STATION FOR LYCOPODIUM SELAGO.—In the Gray Herbarium I find a small but well fruited and unmistakable specimen of *Lycopodium Selago*, L., collected in a cool shaded ravine near New Haven, Connecticut by Mr. John A. Allen in 1879. The plant was evidently sent by Mr. Allen to Dr. Sereno Watson in whose hand the label is written. This specimen seems never to have been recorded and certainly has been overlooked in recent years. It is of interest not merely as a voucher for a plant new to the known flora of the state but as extending a generally alpine and boreal species to the southern coast of New England. The nearest hitherto recorded station is Mt. Holyoke, Massachusetts, where the species was collected in 1903 by Professor George F. Freeman (See RHODORA v. 290).—B. L. ROBINSON, Gray Herbarium.

*Vol. 6, no. 72, including pages 229 to 254 and title-page of the volume was issued 16 December, 1904.*



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